51

X copy

CONFIDENTIAL

COCOM Document 3487

April 13, 1959

MEMORANDUM FROM THE UNITED STATES DELEGATION

CONCERNING

THE COMMUNICATIONS CABLE REQUIREMENTS OF RAILROAD SIGNALLING

1. In order to appreciate the excess communications capacity provided in 14 star quad cable for railroad signal needs and to assist in discussing the coverage of Item 4481, the United States Delegation wishes to present the following non-technical explanation of communications cable requirements for railroad signalling.

2. A railroad signal system is designed to direct the movements of railroad trains. This is done either by oral or written instructions given to the train crew or by various types of visual signals. A part of a signal system should also provide the directing officer with continuous information about the position of the trains under his control.

3. In practice, the oral orders are often given by radio or telephone as well as by word of mouth. Written directions are based on printed time tables supplemented by telegrams picked up by the train crew at stations.

4. Visual signals may be operated by hand, automatically or by the most modern technique called Centralized Traffic Control (CTC). CTC was specifically embargoed by Item 1481 in the old International List. Hand-operated signals are now rarely used except on minor lines and, obviously, require no communications wire at all. Automatic block signals which keep proper spacing between trains are very widely employed and are operated on electrical circuits using the tracks themselves as conductors. No communications wire is needed for their operation.

5. Centralized Traffic Control is used over long stretches of track (60-120 kilometers) where traffic is particularly heavy to permit maximum use of the track. On the Trans-Siberian railroad, for example, only parts of the line use CTC. It electrically adjusts signals and operates switches in the tracks from a central control point. It provides a continuous picture to the directing officer of the position of all trains, the position of track switches and the position of visual signals.

6. The most elaborate CTC system operated in the world today requires only four wires. Even these need not be star quad unless cable is used and the same four wires are also used for simultaneous telephony. The conventional CTC system in the United States and the Soviet Union is operated on only two wires and even these frequently also carry a simultaneous telephone circuit.

7. In addition to these basic signal systems there are a variety of other warning devices to detect breaks in the tracks, rock slides over track, and similar accidents. These are all normally operated using the tracks themselves as conductors and need no communications wire.

8. However, a modern rail signal complex would normally include telephone and telegraph (including teleprinter) circuits connecting stations. All of these communications are comfortably handled by a single star quad using carrier. They can also easily be handled using four pairs of conductors which are not star quad.

CONFIDENTIAL

9. Finally, it should be appreciated that any of the currently used systems of railway signalling can be, and in the United States, normally are, operated on wire and cable not covered by Item 1526. Cable, in fact, is essential only when an electrified railway is in question. Otherwise, open wire (i.e., bare copper wire on poles) is normally used.